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EXAMINER

PARSONS, CHARLES E

ART UNIT

PAPER NUMBER

2613

DATE MAILED: 05/21/2004

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/821,648

Applicant(s)

GENG, ZHENG J.

Examiner

Charles E Parsons

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) ____ is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-44 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 3/01/2004 have been fully considered but they are not persuasive. The Applicant argues that Nayar does not teach using a reflector that satisfies a single viewpoint constraint. The Examiner disagrees with this assertion. A careful reading of the reference especially column 9 lines 49-62 clearly shows that his reflector allows for reflection of a hemispherical scene from a single viewpoint. The Examiner further disagrees with the applicant in his assertion that since Nayar calls his curve substantially parabolic it is impossible for it to read on the claimed constraint. However, Nayar's shape is not a true parabola, his equation in column 8 is not a parabolic equation, thus the shape that satisfies the equation cannot be a parabola either. Nevertheless, he does indeed teach that his shape whatever it is classified as, provides a view of a hemispherical scene from a single view point.

2. As for the argument that Nayar does not teach the use of a controller for creating a mapping matrix that defines a relationship between the image plane and the perspective viewing window, the Examiner disagrees. Once translated into ordinary English, this limitation simply says that there is a conversion that takes place from the coordinate system used by the Mirror, i.e. cylindrical, and the image plane or monitor, i.e. Cartesian. As noted in the first office action Nayar teaches this and his controller is his computer.

Finally, the Examiner reminds the Applicant that while the claims are given their broadest reasonable interpretation, and while they are read in light of the specification, limitation from the specification, however, are not read into the claims.

Therefore the Examiner stands behind his original rejection as it pertains to claims 1-29. Claims 30-44 are further rejected as well.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-6 and 14-23 are rejected under 35 U.S.C. 102(e) as being anticipated by Nayar.

Claim 1, 14, 15 A method for generating a selectable perspective view of a portion of a

hemispherical image scene, comprising the steps of:

acquiring an omnidirectional image on an image plane using a reflective mirror that satisfies a single viewpoint constraint and an image sensor; (See Nayar column 13 lines 10-30)

defining a perspective viewing window based on configuration parameters; (See column 7 lines 62-65 and column 10 lines 56-65)

defining a predetermined geometric relationship between the reflective mirror and the image plane; and (See column 9 line 63 through column 10 line 19)

mapping each pixel in the perspective window with a corresponding pixel value in the omnidirectional image on the image plane using the configuration parameters. (See column 10 line 55 through column 11 line 55 as well as column 12 lines 25-35.)

Claim 2, 18. The method of claim 1, wherein the configuration parameters defined in the defining step include at least one of a zoom distance defined as the distance from the focal point of said reflective mirror to said window, a pan angle defined as the angle between the x axis and a line through the focal point of said reflective mirror perpendicular to the x-y plane and a tilt angle defined as the angle between the x-y plane and a vector normal to said window. (See column 10 lines 55-65)

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Claim 3, 19. The method of claim 2, wherein the defining step is conducted via a user interface through which a user enters data corresponding to at least one of a desired zoom distance, pan angle, or tilt angle. (See Column 7 lines 62-65)

Claim 4, 16, 17, 20 The method of claim 1, wherein the mapping step includes the step of generating a mapping matrix by:
applying a ray tracing algorithm to each pixel in the perspective viewing window to determine a corresponding reflection point on the reflective mirror; and projecting each reflection point to a focal point of the image sensor to determine the corresponding location in the omni directional image on the image plane. (See figures 4, 5, and 6)

Claim 5, 22, 23. The method of claim 4, further comprising the step of storing the mapping matrix in a module having a memory. (See Nayar figure 1A item 125. Computers all have memory)

Claim 6, 21. The method of claim 1 wherein the step of defining a perspective viewing window defines the perspective viewing window as a panoramic viewing window. See column 11 lines 25-30)

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 7-9, 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nayar as applied to claim 1 above, and further in view of Chahl and Mick.

5.

Claim 7, 24: The method of claim 1, further comprising the steps of: calculating a residual image based on a difference between a reference omni-directional image and a sequential omni-directional image; determining if the residual image contains any value that exceeds

a predetermined threshold; and classifying any value that exceeds the predetermined threshold as an anomaly. (Nayar clearly teaches that his system can be used for surveillance purposes see column 1 lines 25-30. While he is not specific as to his motion detection means Chahl clearly teaches that motion detection can be done in a panoramic surveillance system see column 6 lines 25-32. However, he does not specify how he does his motion detection. However, at the time the invention was made, it was well known in the art of surveillance, that in order to detect video motion, the conventional way was to compare subsequent video images and if a large enough difference in the images is detected, it is considered motion. As proof of the Examiners statements he includes Mick, see abstract. Therefore, at the time the invention was made, it would have been obvious to one of ordinary skill in the art, to include motion detection capabilities in Nayars system in order to adapt it for use in the surveillance application he says it can be used for.)

Claim 8: The method of claim 7, further comprising the steps of: calculating the configuration parameters for the perspective viewing window from the anomaly; and selectively focusing the perspective viewing window on the anomaly using the calculated configuration parameters. (See Nayar column 10 lines 32-64)

Claim 9, 25. The method of claim 7, further comprising the step of activating an alarm if at least a portion of the residual image exceeds a predetermined threshold. (See Chahl abstract.)

6. Claim 10-13,26-29 rejected under 35 U.S.C. 103(a) as being unpatentable over Nayar as applied to claim 1 above, and further in view of Baker.

Claim 10, 26. The method of claim 1, further comprising the steps of: detecting a location of a sound source in the image scene; and adjusting the perspective viewing window based on the detected location of the sound source. (While Nayar does not include this feature,

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he does state in column 1 line 26 that his system could be used for teleconferencing. Baker on the other hand, discloses a teleconferencing imaging system that includes a panoramic imaging means including an audio detection circuit that can locate the source of a sound and image it. See Baker abstract. Therefore, at the time the invention was made it was well known in the art, that imaging the source of a sound was desired, thus it would have been obvious to one of ordinary skill in the art, to include the audio detection system disclosed by Baker into Nayar's imaging apparatus to make the invention as claimed.

Claim 11, 12, 27, 28. The method of claim 1, further comprising the step of transmitting the omni-directional image via the Internet. (At the time the invention was made, use of the internet for transmitting images was well known in the art. Once the image is processed as in the case of the current invention, data is data, therefore it doesn't matter that the image came from an omni-directional imaging means. Never the less, while Nayar is silent on use of the Internet, Baker teaches that teleconferencing involves transmitting both the audio and video data to a remote site for viewing. See column 1 lines 16-17. Since teleconferencing implies use of the phone system, and access to the internet is achieved via the phone network, it would have been obvious to one of ordinary skill in the art to transmit the image via a server or any computer capable of handling the job in order to provide a suitable teleconferencing system.)

Claim 13, 29. The method of claim 1, further comprising the step of forming a two way transmission link between the image sensor and a remote display, wherein the two-way transmission link transmits at least one of the omni-directional image, the perspective viewing window, and an audio signal. (Teleconferencing is a two way transmission link.)

7. Claim 30 rejected under 35 U.S.C. 103(a) as being unpatentable over Nayar as applied to claim 1 above, and further in view of Trubko.

30. (new) The improved imaging apparatus of claim 14, wherein said reflective mirror is a hyperbolic mirror having a hyperbolic cross-section. (While it is unclear as to what shape Nayar's reflector is, i.e. the equation that defines it is not that of a parabola nor a sphere, it does resemble that of a hyperbola, never the less at the time the invention was made, it was well known in the art that a hyperbola could be used to view a panoramic scene from a single viewpoint, see Trubko abstract, therefore at the time the invention was made, it would have been obvious to one of ordinary skill in the art to use a hyperbolic mirror in Nayar's invention since the single viewpoint constraint is satisfied using a hyperbolic mirror.)

8. Claims 31-38 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nayar in view of Trubko.

Claim 31, 44. (new) An imaging apparatus for generating a two-dimensional image, comprising: a reflective hyperbolic mirror having a hyperbolic cross-section; an image sensor optically coupled to said reflective mirror that generates two-dimensional image data signals based on an omni directional image reflected by said mirror; ; and a controller coupled to the image sensor, wherein the controller defines a perspective viewing window and includes a mapping matrix generator that defines a geometric relationship between the image sensor and the perspective viewing window such that at least a portion of the omni directional image on the image plane can be mapped to the perspective viewing window. (See Claim 14 and 30 rejections)

Claim 32. (new) The imaging apparatus of claim 31, wherein the reflective mirror creates a one-to-one correspondence between pixels in the omnidirectional image and pixels in the perspective viewing window. (See Nayar column 10 lines 20-31.)

Claim 33. (new) The imaging apparatus of claim 31, wherein the controller maps the omni directional image to the perspective viewing window by mapping each pixel in the

perspective viewing window with a corresponding pixel value in the omnidirectional image. (See Nayar Column 12 lines 25-34)

Claim 34. (new) The imaging apparatus of claim 14, wherein parameters defining the perspective viewing window include at least one of a zoom distance defined as the distance from the focal point of said reflective mirror to said window, a pan angle defined as the angle between the x axis and a line through the focal point of said reflective mirror perpendicular to the x-y plane and a tilt angle defined as the angle between the x-y plane and a vector normal to the perspective viewing window. (The Examiner is assuming that this claim was supposed to be dependent from claim 31 not 14. In either case see (See Nayar column 10 lines 55-65)

Claim 35. (new) The imaging apparatus of claim 34, further comprising a user interface through which a user enters data corresponding to at least one of a desired zoom distance, pan angle, or tilt angle. (See Column 7 lines 62-65)

Claim 36. (new) The imaging apparatus of claim 31, wherein the controller generates a mapping matrix by applying a ray tracing algorithm to each pixel in the perspective viewing window to determine a corresponding reflection point on the reflective mirror and then projecting each reflection point to a focal point of the image sensor to determine the corresponding location on the omni directional image. (See Nayar figures 4, 5, and 6)

Claim 37. (new) The imaging apparatus of claim 31, wherein the perspective viewing window is a panoramic viewing window. (See column 11 lines 25-30)

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Claim 38. (new) The imaging apparatus of claim 31, further comprising a memory for storing a mapping matrix generated by said mapping matrix generator. (See Nayar figure 1A item 125. Computers all have memory)

9. Claims 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nayar and Trubko as applied to claim 31 above, and further in view of Chahl and Mick.

Claim 39. (new) The imaging apparatus of claim 31, wherein the controller calculates a residual image based on a difference between a reference omnidirectional image and a sequential omnidirectional image to detect an anomaly and uses the anomaly to calculate parameters for the perspective viewing window so that the perspective viewing window focuses on the anomaly. (Nayar clearly teaches that his system can be used for surveillance purposes see column 1 lines 25-30. While he is not specific as to his motion detection means Chahl clearly teaches that motion detection can be done in a panoramic surveillance system see column 6 lines 25-32. However, he does not specify how he does his motion detection. However, at the time the invention was made, it was well known in the art of surveillance, that in order to detect video motion, the conventional way was to compare subsequent video images and if a large enough difference in the images is detected, it is considered motion. As proof of the Examiners statements he includes Mick, see abstract. Therefore, at the time the invention was made, it would have been obvious to one of ordinary skill in the art, to include motion detection capabilities in Nayars system in order to adapt it for use in the surveillance application he says it can be used for.)

Claim 40. (new) The imaging apparatus of claim 39, further comprising an alarm that is activated if at least a portion of the residual image exceeds a predetermined threshold. (See Chahl abstract.)

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10. Claim 41-43 rejected under 35 U.S.C. 103(a) as being unpatentable over Nayar and Trubko as applied to claim 31 above, and further in view of Baker.

Claim 41. (new) The imaging apparatus of claim 31, further comprising an acoustic sensor coupled to the controller for detecting a sound source within a scene of said omnidirectional image reflected by said mirror, wherein the controller adjusts the perspective viewing window based on a location of the sound source. (While Nayar does not include this feature, he does state in column 1 line 26 that his system could be used for teleconferencing. Baker on the other hand, discloses a teleconferencing imaging system that includes a panoramic imaging means including an audio detection circuit that can locate the source of a sound and image it. See Baker abstract. Therefore, at the time the invention was made it was well known in the art, that imaging the source of a sound was desired, thus it would have been obvious to one of ordinary skill in the art, to include the audio detection system disclosed by Baker into Nayar's imaging apparatus to make the invention as claimed.)

Claim 42. (new) The imaging apparatus of claim 31, further comprising an image transmission system for transmitting image output by said image sensor via the Internet. (At the time the invention was made, use of the internet for transmitting images was well known in the art. Once the image is processed as in the case of the current invention, data is data, therefore it doesn't matter that the image came from an omni-directional imaging means. Never the less, while Nayar is silent on use of the Internet, Baker teaches that teleconferencing involves transmitting both the audio and video data to a remote site for viewing. See column 1 lines 16-17. Since teleconferencing implies use of the phone system, and access to the internet is achieved via the phone network, it would have been obvious to one of ordinary skill in the art to transmit the image via a server or any

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computer capable of handling the job in order to provide a suitable teleconferencing system.)

Claim 43. (new) The imaging apparatus of claim 31, further comprising: a remote display coupled to the image sensor; a first speaker and first microphone coupled to the image sensor; and a second speaker and second microphone coupled to the remote display, wherein the first and second speakers and first and second microphones form a two-way transmission link between the image sensor and the remote display. (Teleconferencing is a two way transmission link.)

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles E Parsons whose telephone number is 703-305-3862. The examiner can normally be reached on M-TH 7AM to 5 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chris Kelley can be reached on 703-305-4856. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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